Philadelphia University
Faculty of Engineering
Department of Communications & Electronics

Course Syllabus

Course Title: Digital Communications	Course code: (650533)
Course Level: 5th year	Course prerequisite (s) and/or corequisite (s): Analog Communications- (650431)
Lecture Time:	Credit hours: 3 Tutorial: 1 hour/Week

Academic Staff Specifics

Name	Rank	Office Location	Office Hours	E-mail Address

Course module description:

This course covers the following topics:

- Pulse code modulation, TDM Differential PCM.
- Match Filter.
- Intersymbol interference (ISI).
- Baseband M-ary PAM transmission.
- Geometric representation of signals.
- Correlation Receiver.
- Digital modulation techniques (ASK, FSK, PSK, DPSK, and M-ary).
- Effect of noise on digital modulation signals.

Course module objectives:

The main objectives of this course are:

- To understand the basics of modulation concepts.
- To understand the basics of signal-space analysis.
- To understand the concepts of digital transmission.

Course/ module components:

- **Books (title , author (s), publisher, year of publication)**

  Title: Digital Communications.
  Author : Simon Haykin.
  Publisher : John Wiley & Sons, Inc. 4th Edition,2001

- **Support material (s) (vcs, acs, etc).**

- **Study guide (s) (if applicable)**
- **Homework and laboratory guide (s) if (applicable).**

Teaching methods:
Lectures, discussion in class, tutorials, and problem solving.
Duration: 16 weeks, 48 hours in total.
Lectures: 48 hours, 3 per week + two exams (two hours).

Learning Outcomes:

A) Knowledge and understanding Skills:

Students will obtain knowledge and understanding of:

1) Mathematical tools relevant to communications and electronics systems.
2) Fundamental technological concepts, principles, and techniques associated with electronics and communications systems.
3) The structure of different communication systems.

B) Intellectual Skills:

The students will acquire and develop the thinking skills that should enable them to:

1) Develop a strong grounding in the fundamentals and how to apply them.
2) Develop an ability to analyze communication and electronic engineering problems and synthesize solutions.
3) Understanding, designing and developing different communication and electronic systems for processing signals and data.

C) Practical Skills:

Students will acquire and develop the practical skills that should allow them to:

1) Use appropriate numerical and mathematical skills to describe, analyze and solve a problem in electronics or/and communication system.
2) Analyze, design, evaluate, system behavior and test electronic or/and communication system using simulation or computer-based tool (engineering software tool).
3) Undertake ongoing learning in order to keep up to date in the field on electronics and communication technologies.

D) Practical and subject specific skills (Transferable Skills):

Students will acquire and develop the key transferable skills that will enable them to:

1) Manage tasks, and solve problems.
2) Think logically and critically.

Assessment instruments:

• Short reports and/ or presentations, and/ or Short research projects
• Quizzes.
• Home works
• Final examination: 50 marks

Allocation of Marks	
Assessment Instruments	Mark
First examination	15%
Second examination	15%
Final examination: 50 marks	50%
Reports, research projects, Quizzes, Home	20%

works, Projects	
Total	100%

Documentation and Academic Honesty

Submit your home work covered with a sheet containing your name, number, course title and number, and type and number of the home work (e.g. tutorial, assignment, and project).

Any completed homework must be handed in to classroom. After the deadline "zero" will be awarded. You must keep a duplicate copy of your work because it may be needed while the original is being marked.

You should hand in with your assignments:

1- A printed listing of your test programs (if any).
2- A brief report to explain your findings.
3- Your solution of questions.

For the research report, you are required to write a report similar to a research paper. It should include:

- **Abstract**: It describes the main synopsis of your paper.
- **Introduction**: It provides background information necessary to understand the research and getting readers interested in your subject. The introduction is where you put your problem in context and is likely where the bulk of your sources will appear.
- **Methods (Algorithms and Implementation)**: Describe your methods here. Summarize the algorithms generally, highlight features relevant to your project, and refer readers to your references for further details.
- **Results and Discussion (Benchmarking and Analysis)**: This section is the most important part of your paper. It is here that you demonstrate the work you have accomplished on this project and explain its significance. The quality of your analysis will impact your final grade more than any other component on the paper. You should therefore plan to spend the bulk of your project time not just gathering data, but determining what it ultimately means and deciding how best to showcase these findings.
- **Conclusion**: The conclusion should give your reader the points to "take home" from your paper. It should state clearly what your results demonstrate about the problem you were tackling in the paper. It should also generalize your findings, putting them into a useful context that can be built upon. All generalizations should be supported by your data, however; the discussion should prove these points, so that when the reader gets to the conclusion, the statements are logical and seem self-evident.
- **Bibliography:** Refer to any reference that you used in your assignment. Citations in the body of the paper should refer to a bibliography at the end of the paper.

- **Protection by Copyright**

1. Coursework, laboratory exercises, reports, and essays submitted for assessment must be your own work, unless in the case of group projects a joint effort is expected and is indicated as such.
2. Use of quotations or data from the work of others is entirely acceptable, and is often very valuable provided that the source of the quotation or data is given. Failure to provide a source or put quotation marks around material that is taken from elsewhere gives the appearance that the comments are ostensibly your own. When quoting word-for-word from the work of another person quotation marks or indenting (setting the quotation in from the margin) must be used and the source of the quoted material must be acknowledged.

3. Sources of quotations used should be listed in full in a bibliography at the end of your piece of work.

• **Avoiding Plagiarism**.

1. Unacknowledged direct copying from the work of another person, or the close paraphrasing of somebody else's work, is called plagiarism and is a serious offence, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles.
2. Paraphrasing, when the original statement is still identifiable and has no acknowledgement, is plagiarism. A close paraphrase of another person's work must have an acknowledgement to the source. It is not acceptable for you to put together unacknowledged passages from the same or from different sources linking these together with a few words or sentences of your own and changing a few words from the original text: this is regarded as over-dependence on other sources, which is a form of plagiarism.
3. Direct quotations from an earlier piece of your own work, if not attributed, suggest that your work is original, when in fact it is not. The direct copying of one's own writings qualifies as plagiarism if the fact that the work has been or is to be presented elsewhere is not acknowledged.
4. Plagiarism is a serious offence and will always result in imposition of a penalty. In deciding upon the penalty the Department will take into account factors such as the year of study, the extent and proportion of the work that has been plagiarized, and the apparent intent of the student. The penalties that can be imposed range from a minimum of a zero mark for the work (without allowing resubmission) through caution to disciplinary measures (such as suspension or expulsion).

Course/module academic calendar

week	Basic and support material to be covered	Homework/reports and their due dates
(1)	Introduction	
(2)	**Pulse Code Modulation**	
(3)	**Time Division Multiplexing, DPCM**	HW#1
(4)	**Match Filter**	
(5)	**Intersymbol**	
(6) **First examination**	**Baseband M-ary PAM Transmission**	HW#2
(7)	**Signal-Space analysis**	
(8)	**Geometric Representation of Signals**	
(9)	**Likelihood**	
(10)	**Functions**	HW#3
(11)	**Probability of Error**	
(12) **Second Exam**	**Digital Modulation**	
(13)	**Techniques (ASK)**	

(14)	**PSK and DPSK**	
(15)	**(15) Effect of Noise on**	HW#4
(16) **Final Examination**	-------	

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Course references

Books:

1) Bernard Sklar.“ Digital Communications Fundamentals and Applications ”, 2nd Edition 2001, Prentice-Hill International, INC.
2) Leon W. Couch. “Digital and Analog Communication Systems”, 6th Edition 2001, Prentice-Hill International, INC.
3) B.P. Lathi, “Modern Digital and Analog Communication Systems”, 3rd Edition 1998, Oxford University Press, INC.
4) Martin S. Roden, “Analog and Digital Communication Systems”, 4th Edition 2000, Prentice-Hill International, INC.

Digital communication is a mode of communication where the information or the thought is encoded digitally as discreet signals and electronically transferred to the recipients . Digital communication is one of the most commonly used mode of communication in the current scenario. Organisations generally rely on this mode for all their business communications. In digital communication information flows in a digital form and the source is generally the keyboard of the computer. Digital communication systems are becoming, and in many ways have already become, the communication system of choice among us telecommunication folks. Certainly, one of the reasons for this is the rapid availability and low cost of digital components. But this reason is far from the full story. To explain the full benefits of a digital communication system, we'll use Figures 1.7 and 1.8 to help. Figure 1.7. (a) Transmitted analog signal; (b) Received analog signal. Introduction to digital communication. Communication has been one of the deepest needs of the human race throughout recorded history. It is essential to forming social unions, to educating the young, and to expressing a myriad of emotions and needs.Â Digital communication systems, by denition, are communication systems that use such a digital1 sequence as an interface between the source and the channel input (and similarly between the channel output and nal destination) (see Figure 1.1). Digital communication is the broad area that deals with the transmission and reception of binary information across analog channels. Digital communication empowers the Internet since it is the primary mechanism for conveying information across the diverse media employed including optical fiber, copper wire, and air. This chapter summarizes the fundamental concepts of digital communication in an exposition that is independent of the transmission medium. The basic principles of

Introduction to digital communication. Communication has been one of the deepest needs of the human race throughout recorded history. It is essential to forming social unions, to educating the young, and to expressing a myriad of emotions and needs.Â Digital communication systems, by denition, are communication systems that use such a digital1 sequence as an interface between the source and the channel input (and similarly between the channel output and nal destination) (see Figure 1.1). Digital Communication. gale. views updated. DIGITAL COMMUNICATION. In order to understand the notion of digitizing information, it must first be understood that everything in nature, including the sounds and images one wishes to record or transmit, is originally analog. The second thing to be understood is that analog works very well. In fact, a first-generation analog recording can be a better representation of the original images than a first-generation digital recording. Digital communication systems consist of four basic entities: a modulated light source, a length of fiber to transmit the modulated light, periodically placed optical amplifiers to compensate for the attenuation of transmission fiber, and a photoreceiver for conversion of optical to electrical signals (Agrawal 1997).Â Digital communication systems are becoming, and in many ways have already become, the communication system of choice among us telecommunication folks.